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# NOTICE OF APPEAL

Application # 08/418,286

Filing Date: 04/07/95

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## ABSTRACT of the Heat Exchanger

"CUBE", "SQUARE"

A HEAT EXCHANGER **specifically designed for heating or cooling of liquids containing SOLID material** which has a very unique usage.

a) in the SEWAGE TREATMENT FACILITIES as a **Water to Sludge heater.**
b) in the SEWAGE TREATMENT FACILITIES as a **Sludge to Sludge heat recovery unit.**
c) **in industrial applications where liquid SLURRIES are required to be heated or cooled.**

**Refer to FIG 1. And FIG 2 and FIG 7**

The Heat exchanger comprises of horizontally permanently fixed heating plates (12) to define between adjacent heating plates an area of sealed passages for two heat exchanging fluids.

The outer frame comprises of two access doors (20), and two outer walls (26). And two outer door frames (24) to form a permanently fixed rigid structure to provide liquid tight enclosure.

Each heating plate (12) comprises of channels for conducting of the cold or hot liquid sludge **in line or counter flow fashion.**

The heating plate (12) comprises of vertical directional baffles (14) and **round solid bars (34) attached at the end** of (14), order to reduce the risk of plugging with stringy material.

Each directional baffle (14) has a few PRESURE RELIEF HOLES (37), (38) or (39) in Fig. 7. The pressure relief holes are located at the BOTTOM and has shapes of Square, Triangular or Semi Circular.

Each of said channel means being defined by a pair of said heating plates (12) disposed on next to the other and by a pair of directional baffles (14) and an internal return bend means (18).

The internal return bend (18) having a configuration allowing direct access to said channel means at least at one end removable without the necessity to dismantle the entire heat exchanger. the other end could be permanently fixed and liquid tight.

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The External return bends (22) having a predetermined configuration to provide a greater turbulence of the liquid passing through each said channels, said external return bend mean being incorporated into and extending outwardly from said walls (26) and permanently attached to outer door frame (24).

The said heat exchanger further comprising two access doors (20)which are removable and sealed in a liquid tight fashion to allow accessibility simultaneously from two opposite directions with out dismantling the entire unit, said doors being of substantially flat configuration.



## CLAIMS

24R- Internal return bends (18) having a predetermined configuration adapted **to provide a greater flow turbulence** ~~of the~~ fluid passing through each said channels (as per fig. 1 and fig. 11.)
The internal return bend (18) is a **rigid continues flat plat bent in many inward and outward semi hexagonal shapes** (fig 11).

25R- The inner return bend (18) are **permanently fixed between adjacent heating plates (12) to provide liquid-tight** conditions under **high pressure.**

29R- The inner return bend (18) are **removable between adjacent heating plates (12) to provide liquid-tight** conditions under **high pressure.**

31R- The vertical directional baffles (14) is provided with **round solid bars (34) (fig 2) (i is also visible on Fig 1) attached at the end of** (14), in order to reduce the risk of pluggin with stringy materials.

32R- The EXTERNAL **return bends (22) means having in cross-section a semi-octagonal** configuration in order to adapted **to provide a greater flow turbulence of the** fluid passing through.

38R- Each directional baffle (14) has a few **PRESURE RELIEF HOLES** (37), (38) or (39) in FIG 7. The pressure relief holes are located at the BOTTOM and has shapes of Square Triangular or Semi Circular.

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The PRESSURE RELIEF HOLES (ORIFICES) ALOW REDUCTION OF PRESSURE FROM BUILD UP IN CASE OF BLOCKAGE BETWEEN ADJOINING CHANELES.
The pressure relief holes are located at the very bottom of the directional baffle (14) where the liquid starts to fill up.

40R- The inlet flanges (28) an (30) comprises a transition means adapted to connect said inlet in a special manner which will cause any blockage to occur outside of the heat exchanger due to the reduced of passage by the liquid.

When the two transition inlets in Fig 18 and Fig 19 are connected together at the rectangular narrower ends, they form a natural restriction in which preferred location plugging first occur.